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THOMAS J. MINARY

[WITH PORTRAIT INSERT]

THOMAS JAY MINARY, president of the Louisville Railway Company, Louisville, Ky., was born at Versailles, Ky., August 19, 1850. He was educated in the schools of that city, and spent the first two years, after leaving school, in a mercantile occupation. In 1869 he removed to Louisville and engaged in the hardware business until 1872, when he was chosen secretary of the Central Passenger Railway Company, and four years later became its general manager. In 1889 the five street railway companies of Louisville were consolidated into the Louisville Railway Company and he was made general manager of the new organization. He was elected president of the company in 1898, and was also elected president of the Louisville Traction Company upon its organization in 1903. The Louisville Traction Company is a holding company and owns the stock of the Louisville Railway Company and the Louisville & Interurban Railroad Company. The lines of the Louisville Railway Company—then the Central Passenger Railway Company—were electrified in 1889, and had 3.7 miles of road and 10 miles of track. From that small beginning has grown a system of 165 miles of city and 122.6 miles of interurban lines, with 418 motor and 33 trail cars in the former and 42 motor, 7 trail and 12 motor express cars in the latter service. It is interesting to note that Mr. Minary is one of the very few electric railway presidents whose careers have been identified with but one company.

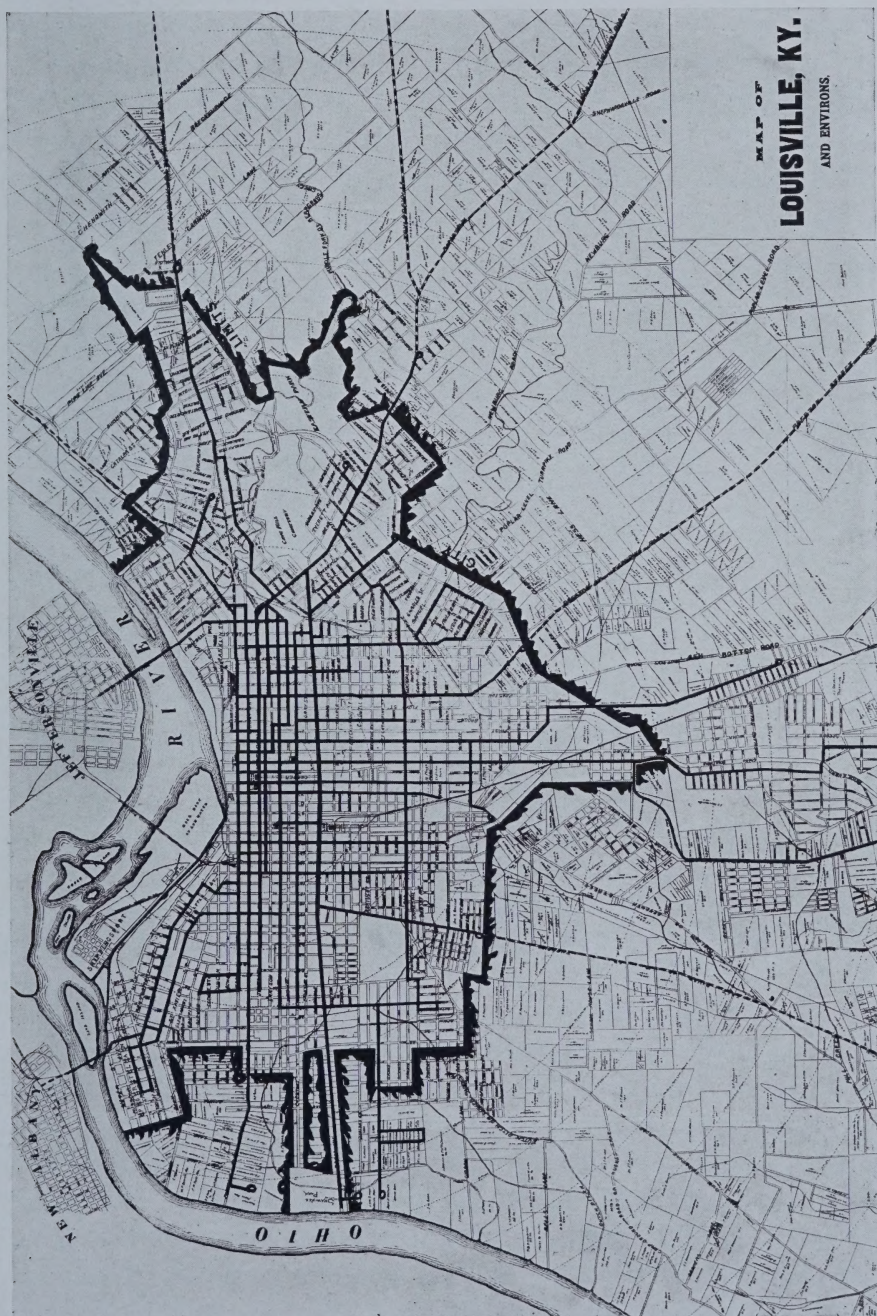
CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

LOUISVILLE, KENTUCKY*

LOUISVILLE, the largest city in Kentucky, and one of the chief commercial and manufacturing centers of the middle-western United States, covers about 27 square miles of a plain along the south bank of the Ohio River, and is surrounded almost completely by a chain of low hills. It is approximately 120 miles southwest of Cincinnati and 295 miles northeast of the confluence of the Ohio and Mississippi Rivers. The surrounding country is comparatively hilly, becoming more rugged toward the southeast, and is rich in agricultural produce, timber, coal and iron. Because of the excellent transportation facilities that have been gradually developed between this region and Louisville, the city has become the foremost center in the country for many valuable products. In 1910 there were 223,928 inhabitants—an increase of 9 per cent in 10 years—and the present estimate places the population at 254,000, indicating a far more rapid rate of growth since the last federal census. The suburban points, just across the city boundary, have an additional estimated population of 85,000, and because the majority are so nearly parts of the city, they may be so considered as regards a general discussion of the city street railway system.

The chief commercial and manufactured product is tobacco in its many forms. The city is the largest leaf-tobacco market in the world, clearing almost the entire Kentucky crop. In 1900 this amounted to 35 per cent of the total tobacco growth of the United States. It is one of the most important whiskey centers in America, and many of the largest distilleries in the country are located there. Trading in mules has assumed the

* The fifty-second article of this series.



magnitude of an industry, and, owing to the unusually high quality of cement bases obtainable near Louisville, it ranks high in the cement world. Pork, wheat, Indian corn, coal and lumber are dealt in extensively. In 1905 the factory-made product was worth \$83,200,000—an increase of 26 per cent in five years—and 15 per cent of this sum represented the prep-



LOUISVILLE TRAFFIC CONDITIONS AND CARS. Looking south on Fourth St., near Jefferson. The heaviest traffic street in the city: all "downtown" intersections with Fourth St. are equally heavy traffic points; 122 cars per hour pass these points during rush periods.

aration of cigars, cigarettes, smoking and chewing tobacco. Other important products are packed meats—particularly pork; men's clothing, among which are the famous "Kentucky jeans"; flour and grist milling; cottonseed oil and cake; malt liquors; leather; foundry and machine-shop products; carriages and wagons; agricultural implements; cast-iron pipe and plumbers' supplies. Louisville has excellent connections with all parts of the country via the Pennsylvania Lines,

New York Central Lines, Baltimore & Ohio System, Illinois Central Railroad, Chesapeake & Ohio, Louisville & Nashville, Chicago, Indianapolis & Louisville, Louisville, Henderson & St. Louis, and Southern Railways. Many Ohio River steamboat lines and interurban electric roads furnish transportation facilities to the less distant places.



LOUISVILLE TRAFFIC CONDITIONS AND CARS. Intersection of Fourth and Market Streets, in the retail shopping district. One of the chief traffic points of the system.

The greater part of Louisville bears evidence of careful planning. The streets average 60 to 120 feet wide, and are well shaded. They are laid out with regularity and intersect at right angles. Some of the longer streets—originally country roads—and the majority of those skirting the river front, or located in the newer outlying districts, are more or less irregular, owing to topographical conditions.

It is characteristic of Louisville that there are few high

buildings; the local conditions hardly require such structures. There are no congested tenement districts; no herding of large populations in small areas; individual houses distinguish the old residential sections in the south as well as the newer ones on the east and west sides of the city. Many beautiful buildings—schools, colleges, libraries and hospitals—add to the municipality's attractiveness. A park system of 1520 acres, distributed principally along the outskirts, and an interconnecting system of boulevards, one of which is six miles long, running south to Jacobs Park, do much to beautify the city.

The closely interwoven street railway lines, shown on the map on page 99, indicate the heart of the city—the business section. Main street, the northernmost parallel street, is the nucleus of the city's wholesale district, the majority of the larger structures being tobacco warehouses. A dozen blocks or so south of Main Street, along Fourth Street—the longest north and south thoroughfare—is the center of the retail shopping district. This centering of business over a comparatively large area and one well adapted to it, renders the handling of rush-hour traffic somewhat easier than in some cities.

The entire city street railway system, as well as an interurban system, is operated by the Louisville Railway Company. The city lines comprise 80 miles of double and 5 miles of single track, a total of 155 miles, 5-ft. gage. The radius of the shortest curve is 35 ft. and the maximum grade is $4\frac{1}{2}$ per cent. The interurban lines aggregate 122.6 miles. While, from a geographical standpoint, the radial method of railway operation would seem most logical in the case of Louisville, a rapid survey of the map will show that, in spite of the exceptional central location of the business area—the focal point of all street railway systems—the method of through-routing adopted by the Louisville Railway Company has the advantages of a radial system and meets the peculiar local requirements as effectively. Straight lines, as far as possible, with a

minimum amount of turning from one street into another; the longest practicable distances, with time-saving loops at the ends of the lines, characterize the whole scheme. There are but two general directions—east and west, and north and south—and sixteen through routes are operated—eight between the eastern and western city limits and eight between



LOUISVILLE TRAFFIC CONDITIONS AND CARS. Jefferson, one of the principal east and west streets, and, like those in the other views, an important artery in through-routing plan. There are eight north and south and eight east and west through-routes.

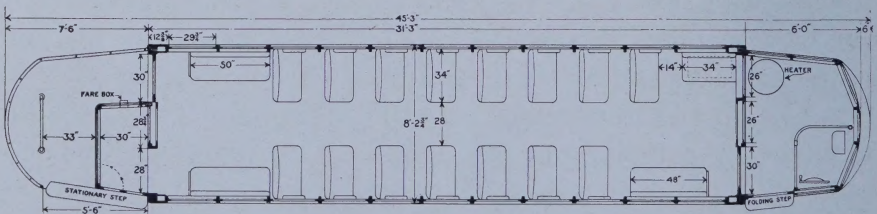
the southern limits and the Ohio River. By this arrangement every car is taken through the center of the city twice on each round trip, instead of once, making it carry a load to and another from the business portion without necessitating switching movements or looping at that point. This plan, it is true, results in a multiplicity of heavy-traffic intersections that, at first glance, would seem to complicate matters. However, the reverse is the case; for, while there are more crossings, the



LOUISVILLE TRAFFIC CONDITIONS AND CARS. Standard city car of Louisville Railway Company. Single-end operation; stationary step and folding exit doors at rear; single sliding exit door and folding step at front end. Entrance portion of rear platform open to accommodate smokers.

number of cars passing each is less than would traverse a single central traffic point. The same amount of equipment is in service, of course, and is routed so as to cover the entire section thoroughly. This is forcibly illustrated during the rush hours—from 6 to 8.30 A. M. and 5 to 6.30 P. M.—at Fourth and Walnut Streets, the heaviest traffic point on the system, when 122 cars pass each hour, or at the rate of $29\frac{1}{2}$ seconds between cars. Similar traffic density exists at the intersections of Broadway, Chestnut, Jefferson, Market and Main Streets with Fourth. The volume of traffic, therefore, is manifestly great, and the efficacy of the system of through-routing is obvious.

There are actually three rush periods per day—the morning



LOUISVILLE TRAFFIC CONDITIONS AND CARS. Conductor stands within entrance compartment on rear platform and controls folding exit doors. Left side of front platform available for standing passengers. Longitudinal seats, 12; cross seats, 30; total, 42.

and evening rush hours, to which previous reference was made, and another about noon. The noon rush is, of course, not nearly so heavy as the other two, and is practically a forerunner of the evening period. It is a distinct period, however, and reaches its peak at about 2 P. M. Usually 157 cars suffice for that service. The morning rush period, when nearly



LOUISVILLE TRAFFIC CONDITIONS AND CARS. Sliding front exit door on right side of bulkhead only. Upper sashes stationary; lower raise.

all traffic moves toward the center, requires 285 cars, and in the evening, when hundreds of shoppers must be carried home, in addition to the great number who are employed "down-town," 334 cars are placed in service. For unusually heavy movements, such as may be occasioned by special attractions at distant amusement resorts, or at holiday times, 418 motor and 33 trail cars are available. In addition to this, the large interurban cars handle a small amount of local city

traffic, but with this exception are limited to their particular class of service, and are not considered in connection with the city lines.

During 1912 the operation of the system produced 11,558,775 car miles, and, in addition to 60,089,114 revenue passengers, 24,000,000 transfer passengers were carried. The ratio of car mileage to revenue passengers shows the traffic density to have been 5.20 per car mile.

The interesting example of single-end prepayment car, with straight sides, that was developed to meet Louisville traffic conditions, differs, principally, from most cars of that type, in its front and rear platform arrangement. The car has a monitor roof. Its over-all length is 45 ft. 3 in., the body measures 31 ft. 3 in. between the corner posts, and the width over the side posts is 8 ft. 2 $\frac{3}{4}$ in. The seats, which provide for 42 passengers, are so arranged as to give maximum aisle space at the bulkheads, as may be seen in the diagram on page 104. A single sliding exit door on the right side of the front bulkhead leads to the front platform. The windows are fitted with two sashes, the upper stationary and the lower made to raise its full height.

The most interesting features of the car are, undoubtedly, the front and rear platforms. Instead of the usual front platform, found in single-end prepayment cars, the space is divided, as shown in the accompanying diagram. The motorman retains fully as good a view to the left as he would were his station moved nearer that side, and has a better view of the exit than he could have from another position. The elimination of a door on the left side of the bulkhead makes room for a heater, and the fact that the bulkhead door and the platform exit door practically meet, reduces the amount of space necessary for alighting passengers, and makes the larger part of the platform available for standing passengers. A sliding door and folding step, operating in unison, are controlled by the motorman.

The use of a rear platform that combines characteristics of both open and closed types is interesting and unusual. Instead of the customary vestibule and dividing railing, the rear and far side of the platform are open and available for smokers. A supporting railing, shown in the accompanying diagram, is placed near the rear end. The conductor stands within the enclosure formed by extending part of the bulkhead to a point on the platform. The diagram indicates this clearly. A two-leaf folding platform exit door, controlled by the conductor, protects alighting passengers, and a single sliding bulkhead door leads from the open portion of the platform to the carbody. During the summer season twenty-four 15-bench open cars supplement the regular equipment.



REPRESENTATIVE TYPES OF ELECTRIC RAILWAY ROLLING STOCK

SINGLE-TRUCK CARS*

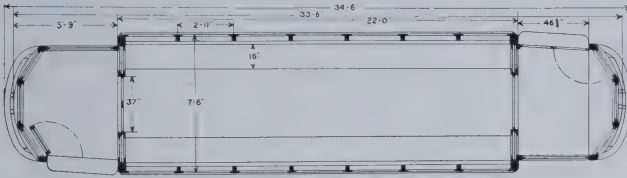
SINCE the widespread adoption of double-truck cars in the United States, and their limited use in foreign countries, the field of the single-truck car, on the whole, while extensive, has become highly specialized. The cars shown on the following pages have been selected out of a large number of types, built at the several Brill plants within the last two or three years, as representative of the various classes of service in this field.

An instance of carefully planned application of single-truck cars is that at Madison, Wis., where, at first glance double-truck cars appear necessary. The reasons for their use are given in an article on page 118 in this issue. In the case

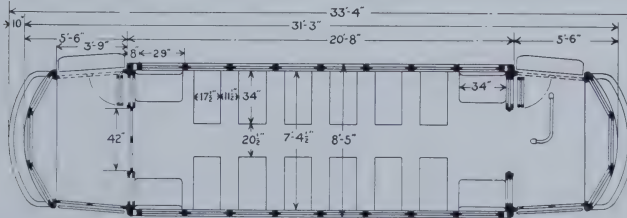
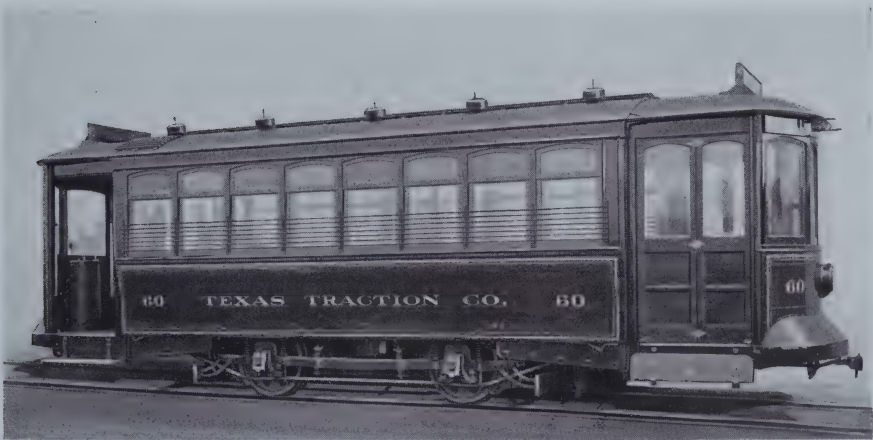
*This is the first of a series of articles on Electric Car Types. The next article will cover double truck city cars.

under review the requirements were specific, and the manner in which they were worked out shows the extent to which single-truck service may be successfully developed under such conditions.

This example is the next step after a single-truck one-man prepayment car service, and illustrates the flexibility of single-truck equipment. The economy of one-man cars, in addition to half the usual platform expense, lies, of course, as in other single-truck types, in lower first cost, lower maintenance and lower operating cost, than double-truck cars. A further step toward economy is the susceptibility of single-truck cars to weight reduction, and this is emphasized by incorporating the Brill plain-arch roof, which is rapidly replacing the older monitor form. The extent to which this weight reduction has been carried is rather striking in the case of Meridian, Miss., where the weight of the new 20 ft. 8 in. carbodies with vestibules and folding doors, illustrated on the top of page 110, is only 8,000 lbs. On a three days' test under service conditions the new cars showed a consumption of only 1.76 kw.h. per mile as compared with 2.87 kw.h. per mile for the older cars, in spite of the latter's shorter length—and it was found, too, that the new cars could maintain a better schedule. An article, fully describing these cars, appeared in the last issue of **BRILL MAGAZINE**. Many of the older and larger roads—aside from those operating single-truck cars in small cities or undeveloped territory—can find many cases where they might use single-truck cars with profit in owl service, as feeders for heavy traffic lines, or in outlying districts of cities, where a fairly frequent schedule may be necessary in spite of low traffic density. Adopted double-truck standards would not have to be sacrificed, for it would be a simple matter to design single-truck cars so that seats, windows, doors and other body parts or equipment, scrapers, sanders, wheels, axles, and in some cases even motors, would be interchangeable with those used on the heavier equipment.



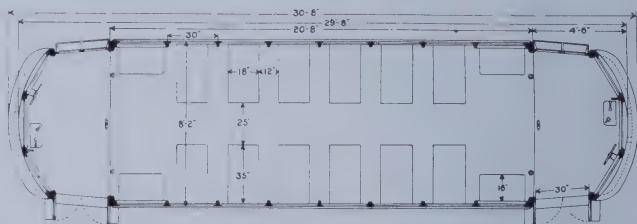
Two-leaf folding doors and stationary steps at diagonal corners. Single drop sash. Seating capacity, 30. All cars in this series mounted on Brill No. 21-E trucks



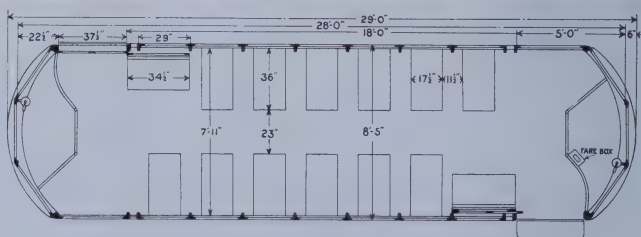
Concavo-convex side panels in single steel sheet. Two-leaf folding platform doors and steps. Upper sash stationary; lower drop. Seating capacity, 32

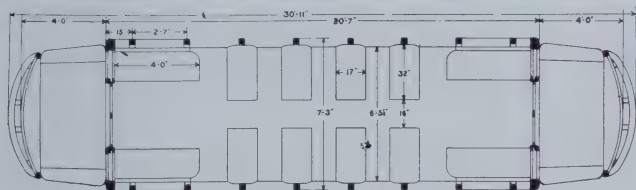


Platform doors swing out. Stationary steps covered by shields on doors. Pipe stanchions in place of bulkheads. Upper sashes stationary; lower raise. Seating capacity, 32

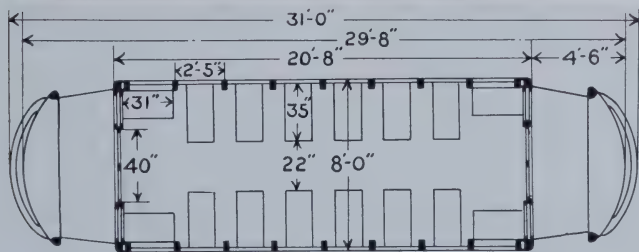


Light-weight one-man car for double-end operation. Sliding door and folding step at motorman's right only. No bulkheads; flush platforms. Stationary upper sash in continuous piece full length of car; lower sashes raise. Seating capacity, 28

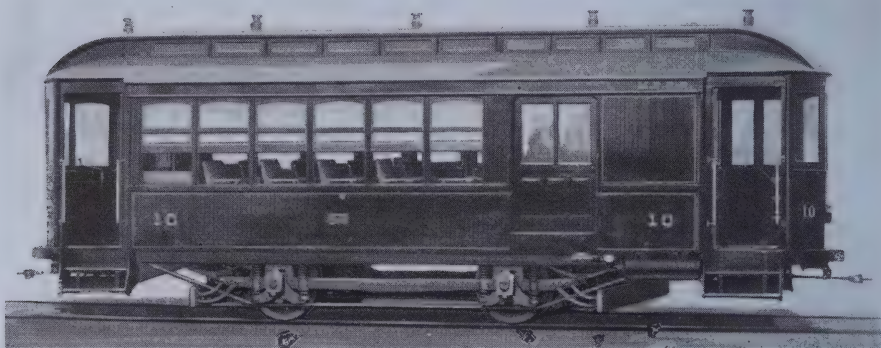




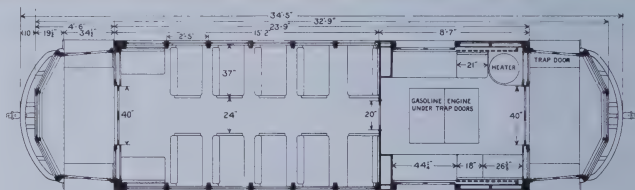
Brill Convertible Car. Steel side panels and double window sashes raise into roof pockets. Entire car converted in less than 5 minutes. May be used with or without running board when open. Seating capacity, 28



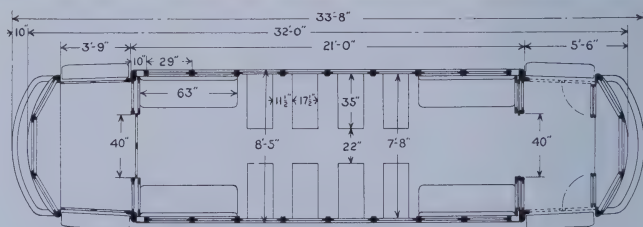
Brill Semi-Convertible Car. Double window-sashes raise into roof pockets; all windows raised or lowered in same time as for ordinary windows. Interior width increased 6 to 7½ in. Seating capacity, 32

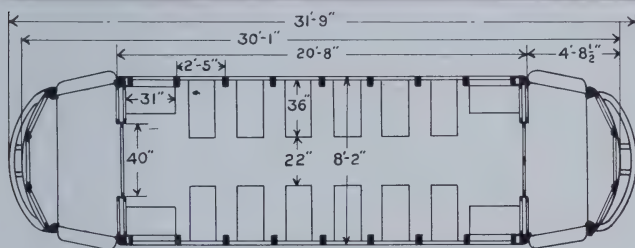


Brill Semi-Convertible Car on Brill 21-E truck. Gasoline motor under baggage end. Steam coach roof and steps. Folding seats in baggage compartment. Seating capacity, 30

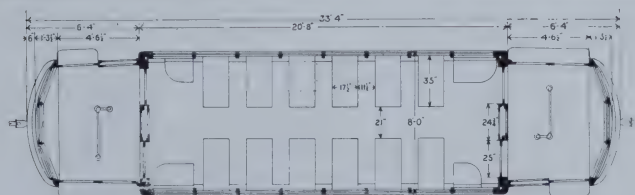


Standard Brill Semi-Convertible Car with two-leaf folding platform doors and stationary steps. Seating capacity, 52





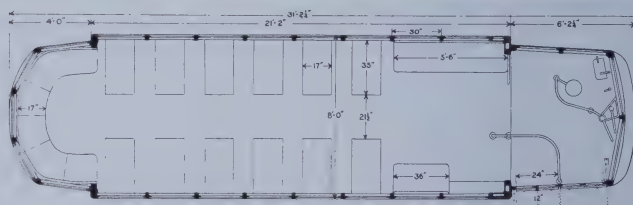
Standard Brill Semi-Convertible Car with open vestibule platform and pantograph gates. Seating capacity, 32. Brill plain-arch roof.



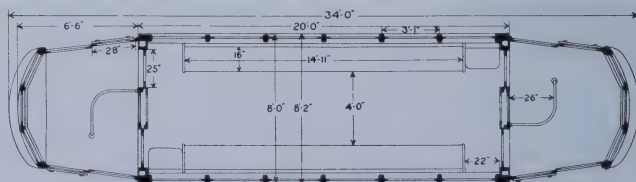
Prepayment Car. Swinging entrance and exit doors, rear; sliding exit door, front. Stationary steps. Separate entrance and exit doors in bulkheads. Brill Semi-Convertible window system. Seating capacity, 30.

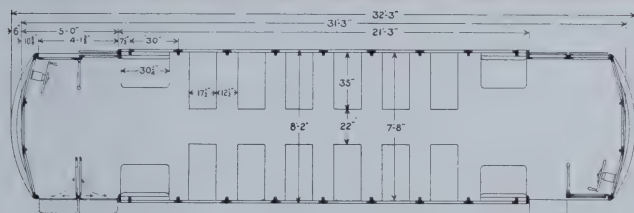


Near-Side Car for one-man operation. No rear exit; no bulkheads; double folding doors and steps. Brill Semi-Convertible window system. Longitudinal seats, 6; cross seats, 24; circular seat, 6; total, 36

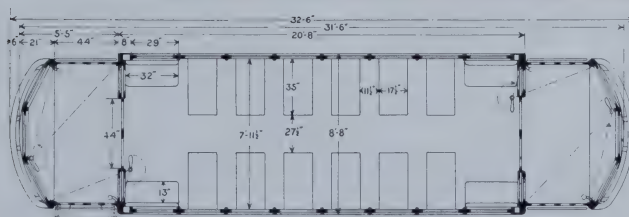


Single sliding doors and folding steps at both ends. Prepayment operation. Upper sashes stationary; lower raise. Brill plain-arch roof. Seating capacity, 24





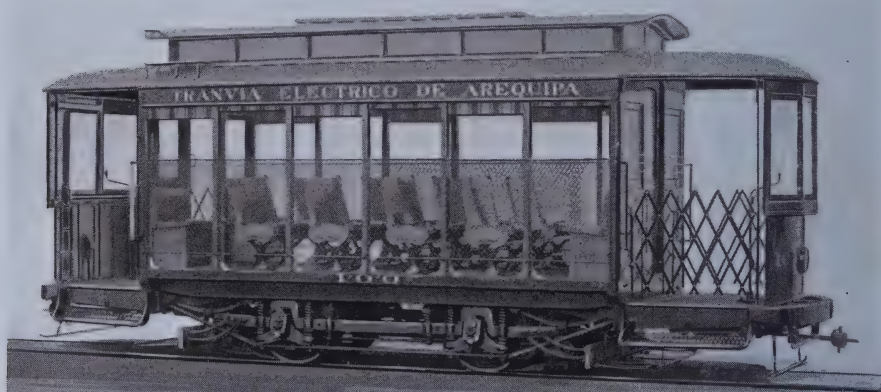
Light-weight prepayment type for one or two-man service. No bulkheads. Double rotary doors and folding steps, rear; single sliding door and folding step, front. Upper sashes in single frame between corner posts; lower sashes raise. Seating capacity, 32



See article page 118. Right rear seat folds up for conductor's position, from which he controls rear folding doors and steps. Motorman controls front doors and steps. Conductor in car makes platform railings unnecessary. Upper sashes stationary; lower raise. Seating capacity, 30



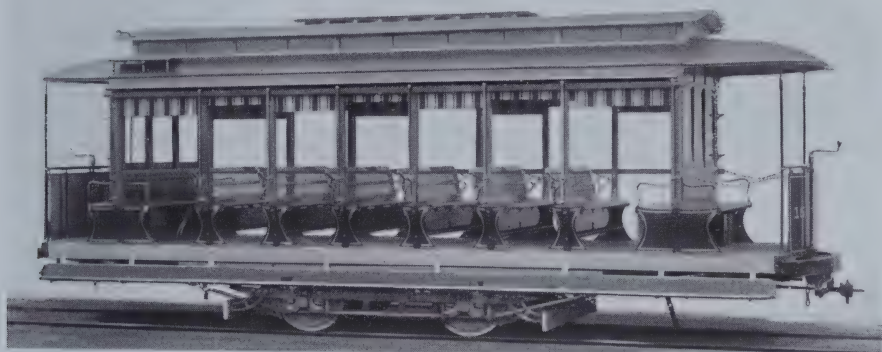
Closed carbody with vestibules and folding doors and steps. Curtains in place of window sashes. Arranged for prepayment service. Seating capacity, 32



Portable vestibules and stationary steps. Wire mesh side guards. Seating capacity, 24.



Skeleton vestibules and stationary steps. Pipe side posts instead of wood. Back to back seats, 28 passengers; side aisles.



Open platforms. Ten benches. Standard single-truck open type.



Permanent vestibules and pantograph gates. Ten benches.



Open platforms. Six benches. Space between two middle benches reserved for baggage.

NOVEL OPERATION OF NEW PREPAYMENT CARS FOR MADISON, WIS.

BRILL No. 21-E TRUCK

MADISON, a city of 35,000, is the capital of Wisconsin and is located in the south-central part of the State, 80 miles west of Milwaukee and 40 miles north of the Illinois boundary. It is only three-quarters of a mile wide at the narrowest part, lying between two lakes—Mendota and Monona—and as a result the lines of the Southern Wisconsin Railway Company are practically restricted to operation in two directions. The American Car Company recently built ten single-truck prepayment cars, like the one in the engraving at the bottom of page 115, for service in the city.

The narrowness of Madison's most important section often produces traffic conditions much like those in larger cities, and therefore it is interesting to go over the reasons for the exclusive use of single-truck cars in so large a community and the platform arrangement and method of operation that have aided in their success.

The underlying reasons for the use of single-truck cars are light weight, low operating cost and the ability, on the part of the railway company, to offer a more frequent service than would be possible with larger cars. Besides these basic principles, the advantages of the prepayment system and folding platform doors and steps were desired. In order to include these features, and still give the greatest freedom of movement to passengers, the dividing railings, generally found on prepayment platforms, were not used, and, instead, mutually-operating sliding doors were put in the bulkheads. The right-hand seat at the rear corner was made to fold out of the way to make room for the conductor. This gives him a place from which he has a clear outlook over the rear platform and



CARS FOR MADISON. Seat at right rear corner folds up for conductor's position ; rear platform used only when carbody is crowded. Upper sashes stationary ; lower raise. Seating capacity, 30. See engravings bottom page 115

the interior of the car, and can collect fares without interfering with passengers. He operates the folding doors and steps on the rear platform, and the motorman controls those at the front end of the car. It seems to have been a simple matter to educate the public to use the front exit ; this of course, greatly reduced the likelihood of congestion at the rear. It was found, too, that push buttons, for signaling the motorman and conductor, were helpful in reducing the length of stops. Passengers are never allowed to ride on the front platform, and the rear platform, which holds about 12 persons, is occupied only while the conductor is collecting fares ; however, when traffic is unusually heavy, passengers may stay there, until the crowd in the car becomes smaller.

When the question was taken up, as to how the body should be designed, it appeared advisable not to use bulkheads,

but experiments made with older cars showed the difficulty of heating the body without them during the severe Wisconsin winters, and while there might have been some advantages in eliminating them they would hardly have offset the difficulty of heating.

The bottomframes follow standard practice, and have $3\frac{1}{2}$ by $7\frac{3}{4}$ -in. yellow pine side sills; $3\frac{1}{2}$ by $9\frac{13}{16}$ -in. oak endsills and $2\frac{3}{4}$ by 6-in. oak crossings. A double floor, with a layer of felt between, is fastened directly to the bottomframe. The corner posts are $2\frac{1}{2}$ in. and the side posts $1\frac{1}{2}$ in. thick, and both have a $2\frac{1}{2}$ -in. sweep. For weight reduction and increased strength, the car is covered with a Brill plain-arch roof. It is fitted with eight adjustable exhaust-type ventilators.

Due to the extremely cold winters, the center vestibule window has two panes of glass, with a dead-air space between. Arch top, double-sash windows are used, the upper sashes of which are stationary and form a single frame between the corner posts; the lower sashes raise their full height. The seating plan provides for 30 passengers, although the diagram on page 115 will show enough seats for 32; however, the fact that the rear right-hand corner seat folds up, when the conductor occupies the space, accounts for the difference. The interior woodwork is cherry and the headlining, which is three-ply veneer, is painted light green, relieved by thin straight lines.

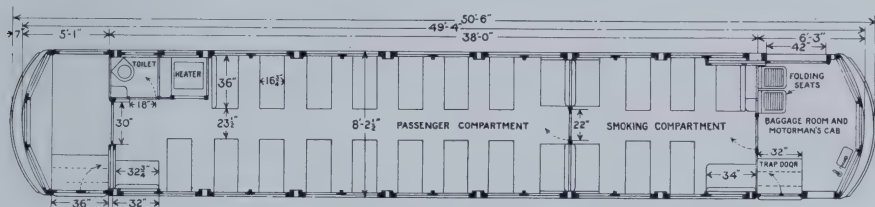
The alarm gongs and track scrapers, and the No. 21-E single-trucks, on which the cars are mounted, were manufactured by the J. G. Brill Company.

Length over corner posts	20 ft. 8 in.	Step to platform	13 in.
Length over platform	30 ft. 6 in.	Platform to floor	9 in.
Length of platforms	5 ft. 5 in.	Seating capacity	30
Centers of side posts	2 ft. 5 in.	Type of truck	Brill No. 21-E
Width over sills	7 ft. $7\frac{1}{2}$ in.	Type of motors	GE226-2-hp.
Width over posts	8 ft. $3\frac{1}{2}$ in.	Weight of car body less elec. equipment	12,800 lb.
From track to side sills	2 ft. $6\frac{1}{4}$ in.	Weight of elec. equipment	1,200 lb.
From side sills over trolley boards	8 ft. $10\frac{3}{4}$ in.	Wt. of motors	4,200 lb.
From floor to center of headlining	7 ft. $10\frac{1}{2}$ in.	Weight of trucks	5,300 lb.
Track to step	16 in.	Total weight	23,500 lb.

FREIGHT-EXPRESS CAR FOR THE NASHVILLE-GALLATIN INTERURBAN RAILWAY

SPECIAL FEATURES

AN article on four passenger cars and a freight-express car—the initial equipment—built for the new Nashville-Gallatin Interurban Railway by the American Car Company, appeared in the February issue of **BRILL MAGAZINE**. The floor plan of the passenger cars and views of the freight-



CARS FOR NASHVILLE-GALLATIN. Single-end operation. Front platform extended for carrying light baggage. Smoking compartment, 16 passengers; main compartment, 36 passengers.
See **BRILL MAGAZINE** for February, 1913

express car which were omitted from the article are shown herewith.

Till the new line was opened the Louisville & Nashville Railroad formed the only rail connection between Nashville and Gallatin, Tenn., and the need for an electric interurban line was evident. The wealth of the territory served by the road, especially from an agricultural standpoint, induced the inauguration of a freight-express service. The comparatively dense population—about 800 persons per square mile—and the general activity in the raising of grain, hay and live stock and extensive dairying, pointed to a continually increasing freight traffic.

The initial freight-express car was built with this in view and was equipped with automatic M.C.B. couplers and two 800-lb.-capacity air cranes, placed at the corners of the side doors, to

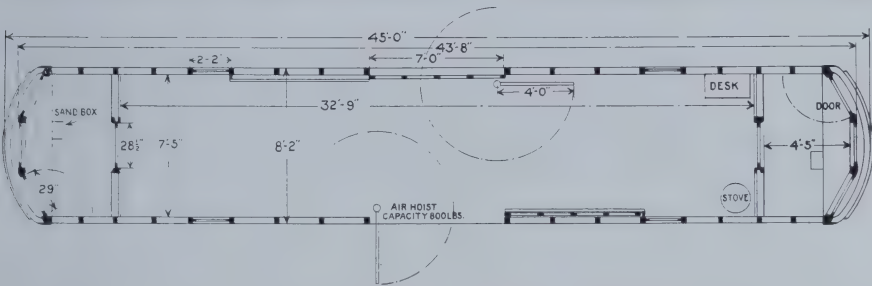


CARS FOR NASHVILLE-GALLATIN. Freight-express car used in local fast freight service. Has M. C. B. automatic couplers for future interchange with steam railroads. Brill No. 27-M.C.B.2 trucks

enable future equipment interchange with steam railroads and to increase the rapidity of loading and unloading. The many small towns along the route are heavy shippers and, because of the absence of freight stations, except at Hendersonville,



CARS FOR NASHVILLE-GALLATIN. Air hoists have 800 lbs. lifting capacity. Permit freight business without installing raised freight platforms. Sliding doors enclosed by solid pockets when open



CARS FOR NASHVILLE-GALLATIN. Size of loading space and width of doors allow handling of bulky materials. Radius of cranes sufficient to load direct from wagons

the largest community on the route, the cranes are practically a necessity. Their use permits wagons to be driven up to the car to have their merchandise quickly transferred, and this is done easily, because the booms swing through a large arc both inside and outside the car. In this way the length of freight stops is materially reduced—and any reduction in the time that merchandise is in transit is appreciated by the shipper and increases the earning power of the car.

Eventually the rapidity of freight movement with equipment of this character will have impressed itself deeply on the minds of shippers and, with proposed extensions of the road completed, a comprehensive freight service is anticipated.



MOTOR-OMNIBUSES FOR WASHINGTON, D.C. PREPAYMENT SYSTEM

BRILL STATIONARY-BACK SEATS

THE steadily increasing use of motor-omnibuses for urban transportation is evidenced by a recent shipment of six such machines to the Metropolitan Coach Company, Washington, D. C., by The J. G. Brill Company. Their growing popularity as a means of passenger conveyance, either as an adjunct to existing street railways or as an independent enterprise, manifests itself in the large number



MOTORBUSES FOR WASHINGTON. Crossings are principal bottomframe members instead of side sills and stringers. Posts reinforced with malleable brackets at sills. All longitudinal members of upperstructure are continuous pieces

of motor-omnibus bodies built by The J. G. Brill Company, for communities in all parts of the country, during the last few years. An article in the November, 1912, issue of *BRILL MAGAZINE* fully describes an unusually interesting double-deck type.

Washington, with its wide, well-paved streets, is probably as well adapted to motorbus operation as any city in the world, and this fact has undoubtedly contributed to the popularity of this form of transportation in that city. However, similar bus lines in other cities and in interurban service, where paving conditions were far from satisfactory, have proved successful and have shown that the construction possesses ample stability to withstand severe racking.

The Metropolitan Coach Company has been operating a fleet of six buses, very much like those in the accompanying illustrations, for about three and a half years. The six new buses run along 15th and 16th Streets between U Street and Pennsylvania Avenue, a distance of $1\frac{1}{2}$ miles. Transfers to the railways are issued at 15th and H Streets, near the White

House. Due to the large number of Federal employees who use the line, two rush-periods have developed—one from 7.30 to 9.30 a. m., with the peak at about 8.30, and the other from 4 to 6.30 p. m., with the peak at about 5 o'clock. The route lies entirely in a high-class residential district, and residents of that section, as well as the many tourists who visit Washington at all seasons, make up about 50 per cent of the traffic.

The bottom frames of the new busses are bolted to a two-ton Mack chassis. Contrary to usual electric car practice, the five crossings, rather than the side sills, are the chief supporting members of the body. They consist of 3 and 4-in. inverted channels, with oak filler for attaching the floor. The front end sill is 3 by 7-in.

oak, reinforced underneath by a 3-in. channel and bent upward $4\frac{1}{4}$ in. at the longitudinal center line to clear the engine fly-wheel. The rear end sill is $2\frac{3}{4}$ by $4\frac{5}{16}$ -in. oak and is interrupted at the center for an 18-in. emergency doorway. As the chassis is fitted with 36-in. wheels, a $3\frac{1}{2}$ by $1\frac{13}{16}$ -in. yellow pine longitudinal stringer, on each side, connecting the two



MOTORBUSES FOR WASHINGTON. Prepayment operation. Doorway for entrance and exit; two-leaf folding door operated by chauffeur

adjacent crossings, rests on the chassis frames opposite the wheels, and compensates for the interruption in the side sills. At the main doorway, which is 40 in. wide and in which the step projects 10 in. into the body, the sidesill is interrupted. The frame is securely braced with steel plates and corner irons, wherever the heavier strains are encountered. The body



MOTORBUSES FOR WASHINGTON. Emergency exit in rear, controlled by chauffeur. Longitudinal seats over wheel boxes. Seating capacity, 16

framing is of ash, with $3\frac{1}{2}$ -in. front corner posts, $1\frac{3}{8}$ -in. side and $5\frac{13}{16}$ -in. rear corner posts. The thickness of the rear posts is due to a sweep of $2\frac{1}{2}$ inches for the rear concave panel. A waist rail, with its upper edge coincident with the upper edge of the concave side panels, extends the full body length and is gained into the posts. The last side post on each side, coming above the wheel box, is reinforced by malleable iron brackets secured to the waist rail. The front end of the body

has a central window post secured to the end sill by two malleable brackets. The roof is supported on ash carlines and concealed steel rafters, as in car practice.

The bus is arranged for prepayment operation and has a two-leaf outward-folding entrance and exit door, under control of the chauffeur, at the forward right corner; in the rear is an emergency exit door, also under his control. The chauffeur occupies the seat indicated in the engraving on page 125; there are four Brill stationary-back transverse seats, immediately following; longitudinal seats over the wheel boxes, for two passengers each and two stationary transverse seats in the rear, for four passengers. The windows, except at the front end, have curved-top, stationary upper sashes and lower sashes arranged to raise their full height. The deck sashes are stationary, and three automatic ventilators in the side sashes and front transom exhaust impure air.

Length over corner posts	14 ft. 10 in.	Pavement to step	13 $\frac{1}{8}$ in.
Centers of side posts	2 ft. 6 in.	Step to floor	13 $\frac{1}{8}$ in.
Width over sills	7 ft. 1 in.	Make of chassis	Mack 2 $\frac{1}{2}$ ton.
Width over posts	7 ft. 6 in.	Wheel base	13 ft. 6 in.
From pavement to side sills 2 ft. 1 in.		Diameter of wheels	36 in.
From side sills over roof	7 ft. 11 in.	Wt. of body less chassis	2,940 lb.
From floor to center of headlining	7 ft. 6 $\frac{1}{2}$ in.	Wt. of chassis	4,380 lb.
		Total weight	7,320 lb.



WOODS USED IN INTERIOR FINISH OF CARS

PART II

CAR work differs from furniture and other cabinet work in that the surfaces requiring a high finish are generally narrower or of smaller area, and for that reason doors, paneling and wainscoting are cut from solid wood instead of being merely veneered. The heavy vibrations and strains to which car sides are subjected are transferred in a small degree to the interior paneling, and experience has shown better results with solid wood. In steam railroad



coaches and sleeping cars the bulkhead panels and the exposed surfaces under the upper berths are often veneered; in the former case because veneers are taken from the highest grade lumber and present the finest grain, and in the latter owing to the curve assumed by the under side of the berth, which would probably hazard bending the solid wood.

Headlinings are usually of birch, maple or oak veneer, artificial lumber, composition, steel or aluminum. In all-steel cars headlinings of one of the four latter materials are employed, chiefly for their fireproof qualities. In many instances roofs of wooden cars also are sealed with such material, but the continued popularity of veneer is reflected in the large number of installations each year. The lustre and attractively figured grain of birch and maple veneers give the car a bright, clean appearance, and, when harmonized with a rich wood for the sides, lend it much beauty. Oak veneer headlining is often preferred for steam railroad buffet and dining cars because it gives the impression of substantial, and yet tasteful, construction, when harmoniously matched with the finishing wood used in other parts of the car. The tendency, however, points to the eventual elimination of wood headlinings, and, while the new materials do not possess the same degree of beauty, they may be painted to produce any result, and have the further advantages of not warping or shrinking, being moisture proof, and less likely to creak when the car is in motion.

The theory has been advanced that veneered interior finish is a better non-conductor of heat than solid paneling, owing to there being one or more layers of wood. Experience has shown the fallacy of the theory, for veneer would be the better non-conductor only if there were dead air spaces or layers of some non-conducting material between the wood sheets. The absence of such spaces and the fact that the glue between them forms an air-tight connection, places the conductivity of veneers on approximately the same basis as that of solid woods.

